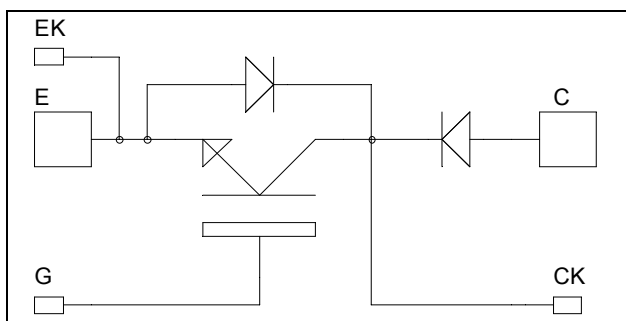


Single Switch with Series diodes NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 300A @ T_c = 80^\circ C$



Application

- Zero Current Switching resonant mode

Features

- Non Punch Through (NPT) FAST IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- Low profile
- RoHS compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	400
		$T_c = 80^\circ C$	300
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	600
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1780
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	600A @ 1200V



CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$		500	μA
			$T_j = 125^\circ\text{C}$		750	
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 300\text{A}$	$T_j = 25^\circ\text{C}$	3.3	3.9	V
			$T_j = 125^\circ\text{C}$	4		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 12\text{mA}$	4.5		6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$			± 1	μA

Dynamic Characteristics

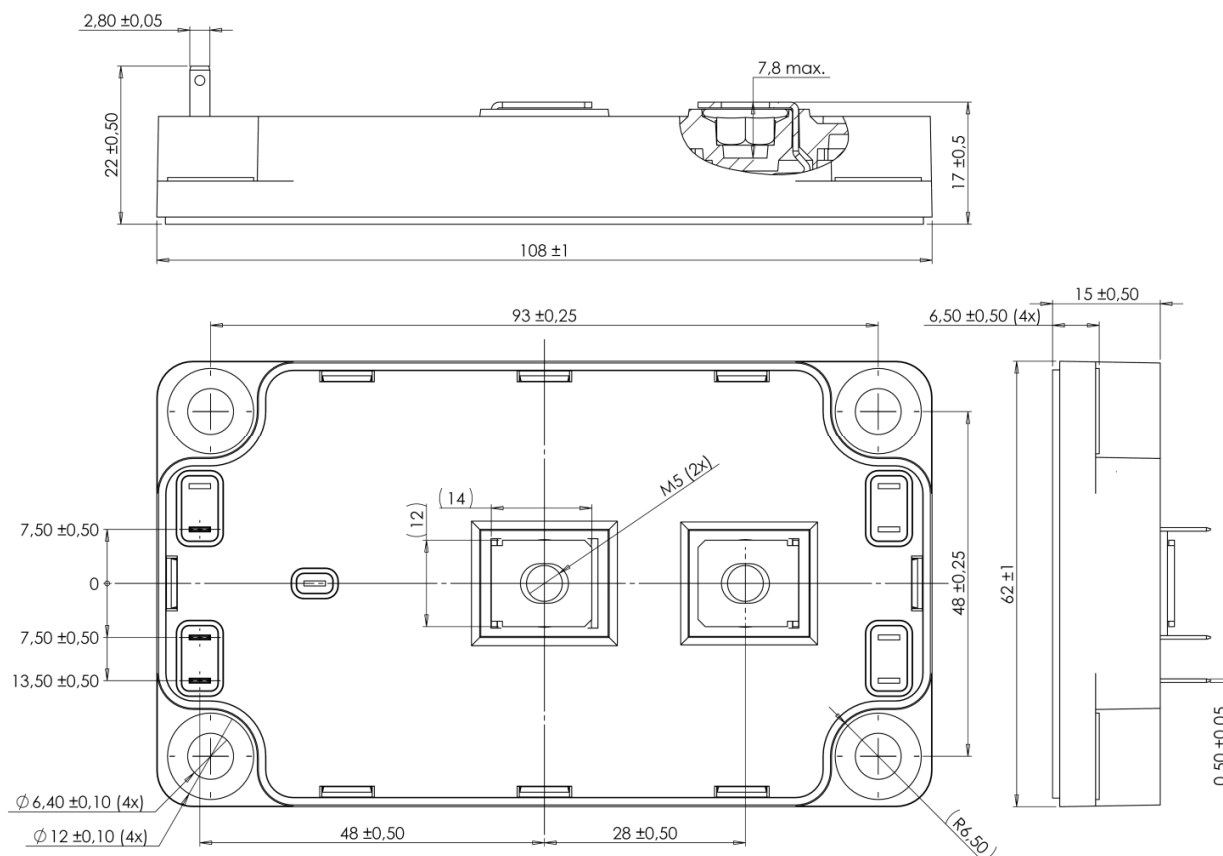
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		21		nF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		2.9		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.52		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		120		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$		50		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600\text{V}$		310		
T_f	Fall Time	$I_C = 300\text{A}$ $R_G = 3\Omega$		30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		130		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$		60		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600\text{V}$		360		
T_f	Fall Time	$I_C = 300\text{A}$ $R_G = 3\Omega$		40		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$	$T_j = 125^\circ\text{C}$	25		mJ
E_{off}	Turn-off Switching Energy	$I_C = 300\text{A}$ $R_G = 3\Omega$	$T_j = 125^\circ\text{C}$	15		

Diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		500	
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$	300		A
V_F	Diode Forward Voltage	$I_F = 300\text{A}$	$T_j = 25^\circ\text{C}$	2.1		V
			$T_j = 125^\circ\text{C}$	1.9		
t_{rr}	Reverse Recovery Time		$T_j = 25^\circ\text{C}$	120		ns
			$T_j = 125^\circ\text{C}$	210		
Q_{rr}	Reverse Recovery Charge	$I_F = 300\text{A}$ $V_R = 600\text{V}$ $di/dt = 4500\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	22		μC
			$T_j = 125^\circ\text{C}$	43		
E_r	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$	7		mJ
			$T_j = 125^\circ\text{C}$	15		

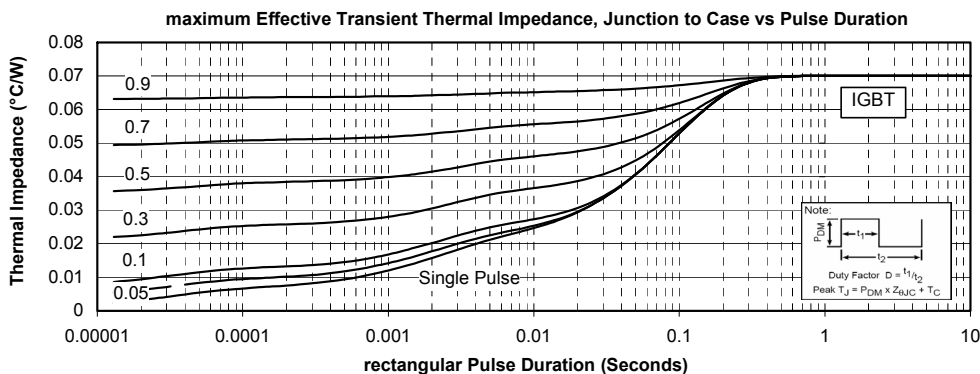
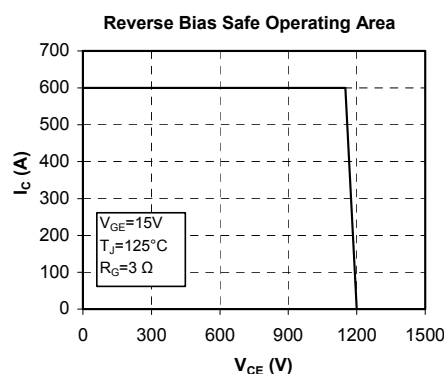
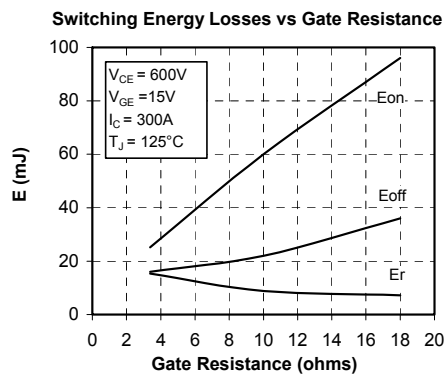
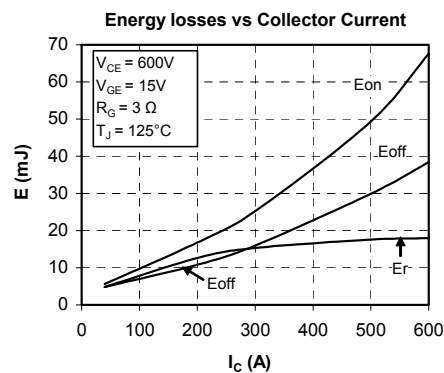
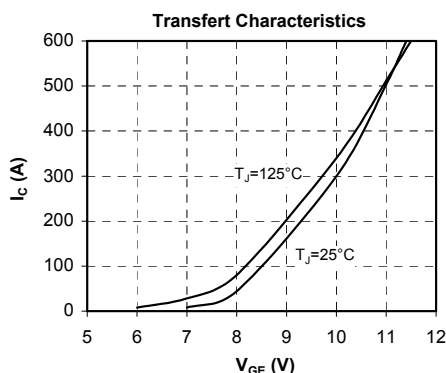
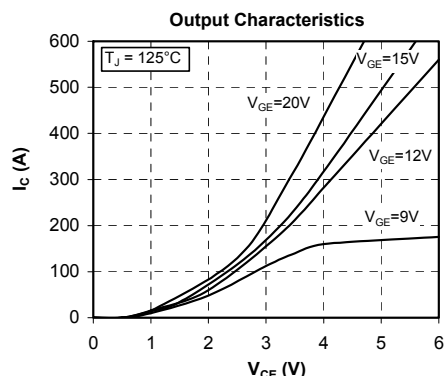
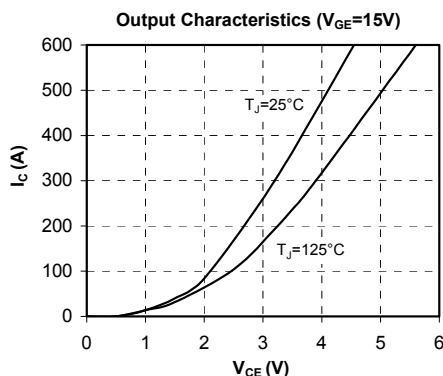
Thermal and package characteristics

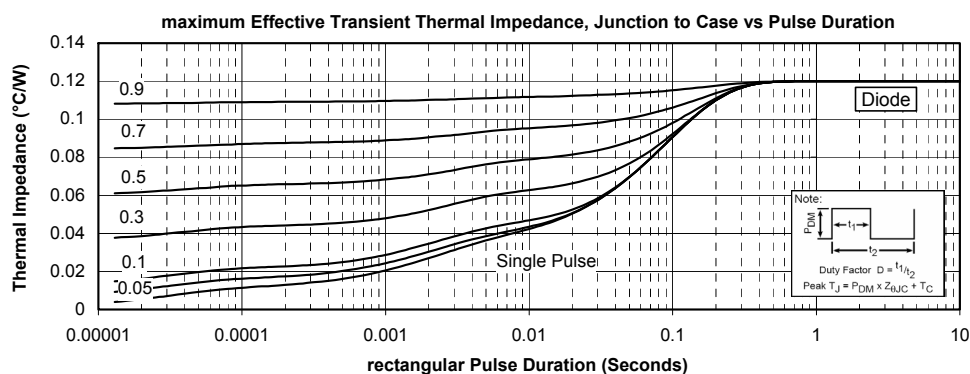
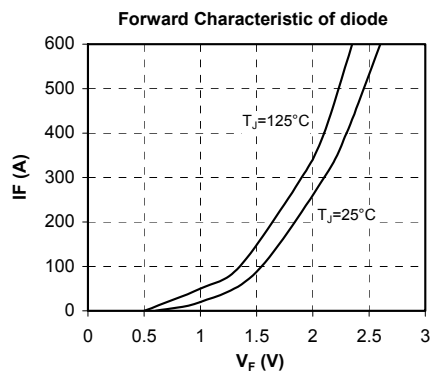
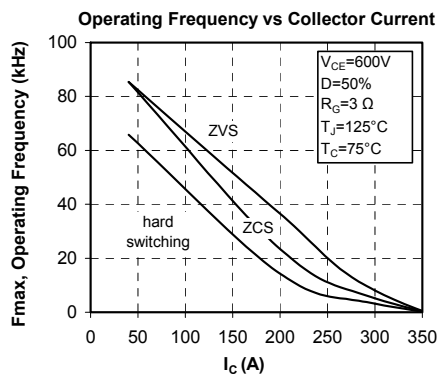
Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.07	°C/W
		Diode			0.12	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz		4000			V
T _J	Operating junction temperature range		-40		150	°C
T _{STG}	Storage Temperature Range		-40		125	
T _C	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight				300	g

SP6 Package outline (dimensions in mm)


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve





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